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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/521,856 | 01/21/2005 | Martin Hillebrand Blees | NI 020715 | 6174 |

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| EXAMINER | |
|---|---|
| ZIMMERMAN, JOSHUA D | |
| **ART UNIT** | **PAPER NUMBER** |
| 2854 | |

DATE MAILED: 07/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/521,856 | BLEES, MARTIN HILLEBRAND | |
| | Examiner | Art Unit | |
| | Joshua D. Zimmerman | 2854 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *19 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-7 and 10-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 10-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 January 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/27/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election with traverse of the invention of Group I in the response filed 5/19/2006 is acknowledged. The traversal is on the grounds that the subject matter of all claims is sufficiently related that there would be no additional search; thus there would be no serious burden. This is not found persuasive. The two groups outlined in the restriction requirement would require an additional search, as they are patentably distinct for the reasons outlined in the restriction requirement. Hence, the burden in the examination of multiple inventions lies in consideration of the patentably distinct inventions in one application.

Hence, the requirement is still deemed proper and is therefore made FINAL.

Regardless, applicant has canceled the non-elected claims, and therefore any traversal of the requirement is now moot.

### *Claim Objections*

2. Claims 6, 7, 11 and 12 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. See MPEP § 608.01(n). Since in a prior amendment to the claims, the multiple dependencies were removed, it is assumed that applicant meant for the non-elected claims of the previous version to be canceled and not for the original, improper multiple dependencies to be reinstated. For the purpose of furthering prosecution, Examiner will rely upon the previously amended version of the elected claims.

***Claim Rejections - 35 USC § 103***

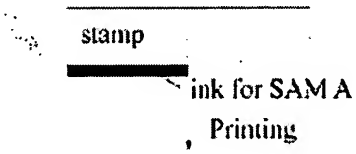
The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Delamarche et al. (J. Am. Chem. Soc. 2002, 124, 3834-3835).

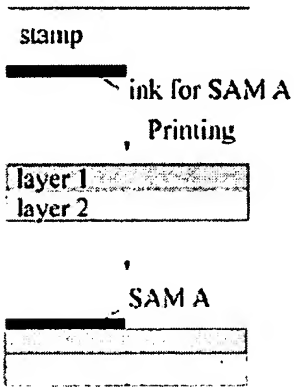
Regarding claim 1, Delamarche et al. teach "a method of applying a self-assembled monolayer of a molecular species to a surface of an article (Figure 1A), comprising:

providing on at least a portion of a stamping surface of a stamp a self-assembled monolayer-forming molecular species (see 'ink for SAM A' in reproduced section of figure 1A)




having a first functional group selected to attach to said surface, and a second functional group that is exposed when the species form a monolayer, said second group being polar (the species used by Delamarche et al. is an alkanethiol, the same as applicant. See second sentence of the second paragraph on page 3834),

transferring the molecular species from the stamping surface to a first portion of the article surface (see reproduced section of figure 1a below)."



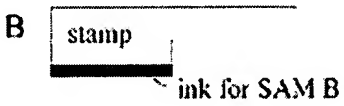

Delamarche et al. do not specifically teach "and allowing the molecular species to spread evenly from the first portion of the article surface to a second portion of the article surface, characterized in that the spreading is accomplished with the stamp." However, Delamarche et al. teach that when forming a self-assembled monolayer (SAM), the stamp is left in contact for an amount of time (first full paragraph of page 3835). One having ordinary skill in the art would recognize that the stamp is left in contact for an amount because the formation of SAMs is a kinetic process (that is, a process that is time-dependent), and therefore the stamp is left in contact with the article surface in order to allow the SAM to form. One having ordinary skill in the art would also recognize that when a SAM-forming species is applied to a surface, due to surface tension effects and to gravity, the species will naturally spread on the surface (see, for example, figure 2 of Delamarche et al.). Therefore, the molecular species in the method taught by Delamarche et al. would "spread evenly from the first portion of the article surface to a second portion of the article surface."

Delamarche et al. are also silent in regards to the atmosphere of the stamping process. Since no special conditions are mentioned, a normal air atmosphere is

implied. One having ordinary skill in the art would recognize that a normal air atmosphere is used by Delamarche et al., and would have used the process of Delamarche et al. "in a vacuum or in a gaseous atmosphere," that is, normal air.

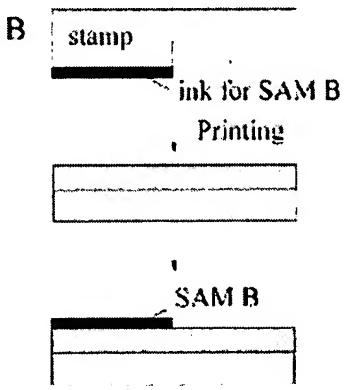
Regarding claim 2, Delamarche et al. teach "a method of applying self-assembled monolayers of two molecular species to a surface of an article (figure 1B), comprising:

providing on at least a portion of a stamping surface of a stamp a first self-assembled monolayer-forming molecular species (see 'ink for SAM B in reproduced figure below)



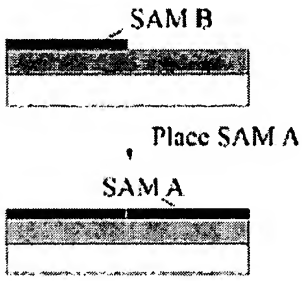

having a first functional group selected to attach to said surface, and a second functional group that is exposed when the species form a monolayer, said second group being polar (Delamarche et al. use the same species as applicant, PTMP),

transferring the molecular species from the stamping surface to a first portion of the article surface (see reproduced section of figure below),



providing ... a second self-assembled monolayer-forming molecular species having a first functional group selected to attach to said surface, and a second functional group that is exposed when the species form a monolayer, said second group being polar or non-polar (Delamarche et al. use the same species as used by applicant, ECT),

transferring the molecular species ... to said first portion of the article surface coated with a monolayer of said first molecular species (see reproduced section of Figure 1B below)."




Delamarche et al. fail to specifically teach that the second molecular species is applied via a stamping process. Delamarche et al. simply teach "plac[ing]" the second species (see the reproduced section of Figure 1B, above). Figure 2 of Delamarche et al. shows that the second SAM (ECT) does not significantly replace the first SAM (PTMP) on the surface; therefore, one having ordinary skill in the art would recognize that applying the second SAM-forming species on top of the first SAM-forming species by forcibly using a stamp would result in the second SAM-forming species spreading over the first SAM and then adhering to the surface of the article and forming a second SAM. One having ordinary skill in the art would also recognize that applying pressure while applying the second species would speed up the coating process. Further, since

the first SAM-forming species is applied via a stamp in the process of Delamarche, one having ordinary skill in the art would have been motivated to apply the second SAM-forming species to the article via a stamping process in order to effectively apply and distribute the second SAM-forming species.

Also, Delamarche et al. do not specifically teach "and allowing the second molecular species to spread evenly over the first monolayer to a second portion of the article's surface." However, Delamarche et al. teach that when forming a self-assembled monolayer (SAM), the stamp is left in contact for an amount of time (first full paragraph of page 3835). One having ordinary skill in the art would also recognize that formation of SAMs is a kinetic process (that is, a process that is time-dependent), and therefore would be motivated to leave the stamp in contact with the article surface in order to allow for distribution of the SAM-forming species and to allow for the molecules to self-assemble. One having ordinary skill in the art would also recognize that when a second SAM-forming species is applied to a first SAM, due to surface tension effects, gravity, and the pressure applied by the stamp, the species will naturally spread on the surface (see, for example, figure 2 of Delamarche et al.). Therefore, the molecular species in the method taught by Delamarche et al. would "spread evenly over the first monolayer to a second portion of the article's surface."

Regarding claim 3, Delamarche et al. are silent in regards to the atmosphere of the stamping process. Since no special conditions are mentioned, a normal air atmosphere is implied. One having ordinary skill in the art would recognize that a

normal air atmosphere is used by Delamarche et al., and would have been motivated to use the process of Delamarche et al. "in a vacuum or in a gaseous atmosphere," that is, normal air. See the above discussion with regards to the further limitation of spreading via use of the stamp.

Regarding claim 4, Delamarche et al. further teach "wherein the second functional group of the second self-assembled monolayer-forming molecular species is non-polar (Delamarche et al. use the same species as applicant, PTMP).

Regarding claim 5, Delamarche et al. are silent in regards to the atmosphere of the stamping process. Since no special conditions are mentioned, a normal air atmosphere is implied. One having ordinary skill in the art would recognize that a normal air atmosphere is used by Delamarche et al.

Regarding claim 6, Delamarche et al. further teach "wherein the article' surface is a metal surface (see figure 3 and first 4 lines of the second paragraph on page 3834) and the self-assembled monolayer-forming molecular species is selected from the group consisting of:

an omega-functionalized thiol having the general formula R'-A-R", wherein R' is --SH, A is --$(CHR)_n$-- where R is H or --$CH_3$, and n is an integer from 1 to 30, and R" is a polar group (see figure 1, ECT, and the first 4 lines of the second paragraph on page 3834),

a disulphide having the general formula R'"-A-S-S-A'-R", wherein R'" is a polar or a non-polar group, A and A' independently are --$(CHR)_2$n-- where R is H or --$CH_3$, and n is an integer from 1 to 30, and R" is a polar group, different from or the same as R'", and

a thioether having the general formula R'"-A-S-A"-R" or R'"-A-S-A'-S-A"-R", wherein R'" is a polar or a non-polar group, A, A', and A" independently are --$(CHR)_2$n-- where R is H or --$CH_3$, and n is an integer from 1 to 30, and R" is a polar group, being different from or the same as R'"."

Regarding claim 7, Delamarche et al. further teach "wherein the polar group R" is a functional group selected from the group consisting of --OH, --NCO, --$NH_2$, --COOH, --$NO_2$, --COH, --COCl, --$PO_4^{2-}$, --$OSO_3^-$, --$SO_3^-$, --$CONH_2$2, --$(OCH_2$2$CH_2$2$)_{2n}$OH, --$(OCH_2CH_2)_{2n}OCH_3$, --$PO_3H^-$, --CN, --SH (see figure 1, ECT, and the first 4 lines of the second paragraph on page 3834), --$CH_2$I, --$CH_2$Cl, and --$CH_2$Br, wherein n is an integer from 1 to 100."

3. Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Delamarche et al. as applied to claim 1 above, further in view of Geissler et al. (*Langmuir* **2002**, 18, 2374-2377) and Xia et al. (*Angew. Chem., Int. Ed.* **1998**, 37, 550-575).

Regarding claim 10, Delamarche et al. fail to specifically disclose that their method of forming a self-assembled monolayer is used to manufacture an electronic device. However, Delamarche et al. teach that their method is used to form patterns on various substrates, including those common to microelectronics (first 4 lines of the second paragraph of page 3834), and refers to numerous publications that teach said methods. Xia et al. (the first citation of Delamarche et al.) and Geissler et al. (the third citation of Delamarche et al.) teach using SAMs with microcontact printing to produce

microelectronic devices and storage elements because it is simple, inexpensive, and flexible (see section 3, specifically the last paragraph of section 3.2 of Xia et al. and the first paragraph of Geissler et al.). Therefore, it would have been obvious to one having ordinary skill in the art to use the microstructure production method of Delamarche et al. to produce microelectronic devices, as taught by Geissler et al. and Xia et al., because it is simple, inexpensive and flexible.

Regarding claim 12, see the sentence bridging pages 559 and 560 of Xia et al.

4. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Delamarche et al., Geissler et al. and Xia et al., as applied to claim 10 above, further in view of Katz, (US 6,403,397).

Regarding claim 11, Delamarche et al., Geissler et al. and Xia et al. teach all that is claimed but fall short of explicitly teaching creating field effect transistors (FETs) using SAMs. However, Katz teaches using SAMs and microcontact printing to produce field effect transistors (column 3, lines 25-29). One having ordinary skill in the art would have been motivated to use microcontact printing using SAMs to produce FETs as taught by Katz, because it is simple, inexpensive and flexible.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joshua D. Zimmerman whose telephone number is 571-272-2749. The examiner can normally be reached on M-R 8:30A - 6:00P, Alternate Fridays 8:30A-5:00P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Hirshfeld can be reached on 571-272-2168. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Joshua D Zimmerman
Examiner
Art Unit 2854

jdz

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SUPERVISORY PATENT EXAMINER
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